Seaweeds as Fodder

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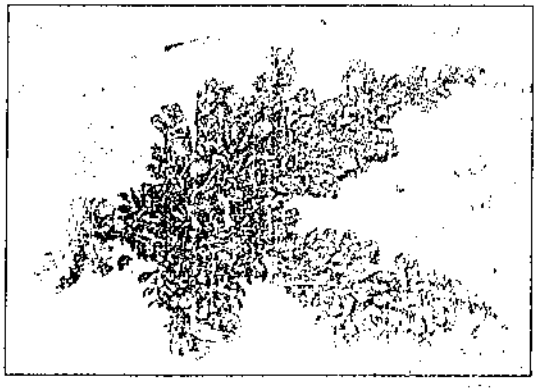
Livestock wealth of India comprising 210 million cattle (15 % of world production), 92 million buffaloes (54% of world) , 57 million goat (20% of world) and 121 million sheep (20% of the world) is in a very critical state in the face of mounting deficiency of feed and fodder (*Indian Livestock Review*, 1999). As per 1995-1996 data, availability of oil cake was only 20.74 million tonnes (mt) as against the annual requirement of 496.58 mt. Similarly, the availability of green and dry fodder were 300 mt and 310 mt respectively as against the requirement of 2037 mt and 722 mt respectively. Therefore, we must continually strive to find the ways and means to bridge the gap between the demand and supply to keep pace with desired production level of our livestock. The most part of the cultivated land is in use for production of food grains for human beings and conventional fodder crops stand no chance to be grown on such a precious land. Owing to the shortage of animal feed in our country, animal nutritionists have worked out the possibility of utilizing the unconventional feed in cattle ration. Seaweed is one of the such unconventional ingredients which is available in large quantities and needs to be taken on priority basis for its optimum utilization in animal ration to meet out the requirements of feeds and fodder. This becomes more relevant in a situation when rapid expansion of dairy industry, increase in prices of conventional feed resources, over population of human beings and increased demand of animal protein is increasing day by day.

Shrinkage of cultivable land due to urbanization and shortage of water limit the possibility of producing more feed and fodder to livestock from land. Sea remains untapped and the seaweed resources has got immense potential to fill the gap in India. Marine macroscopic algae popularly known as seaweeds are being used as a source of food, feed, fodder, fertilizer and source of various fine chemicals like agar, carrageenan and alginates. Historical records show that the use of seaweeds in agriculture and as animal feed had been in use as early as first century BC by the Greeks. Seaweed has been used by farmers living near the sea in Europe.



In Norway *Ascophyllum* is used as pigmeal, *Rhodymenia palmata* a red seaweed is called cow weed in Brittany and horse weed in Norway. Dried and processed seaweeds have been used as animal feed in Europe and North America. It has been found that seaweed's use has increased the fertility rate and birth rate of animals. This may be due to

the presence of Tocopherol and sterility vitamin-E. Both milk production and fat yields have been found to increase by using seaweed as part of the diet. It has been shown that cattle grazed on *Laminaria* sp.based diet have better natural resistance to diseases such as foot and mouth. Due to the presence of fucoxanthin and iodine in the seaweeds it has been found that colour of the yolk in eggs improve when the hens were fed with the seaweed meal. In the USA, when hens were fed with 1.25% seaweed added to their normal ration, the proportion of thin celled-eggs were reduced from 3-19% and when after 3 months the seaweed addition to the diet was discontinued, the proportion of thin celled eggs again increased to 3%.

Literature reveals that several species of seaweeds are used as feed and fodder in Norway, France, Finland, USA and many other countries. Experiments using 3500 sheep showed that an addition of 35 g per day of seaweed meal gave a 3.3 % increase in winter wool which was increased a further of 17% even if the sheep had no mineral supplement, indicating seaweeds as a good mineral supplement. In the case of cows, use of seaweed meal increased butter fat content by 6.8% over a seven year experimental period and also reduced the incidence of mastitis. Seaweeds are known to have essential aminoacids ratio, which is considered optimum for human food. Studies indicate that digestibility of *Macrocystis pyrifera* and *Sargassum* spp by bovine cattles is 85% and 55% respectively. Seaweed treated pasture forages increased immunity in pigs and chicks.

India is endowed with 6000 km coastline and bestowed with more than 0.2 mt/year wet harvestable biomass of seaweeds belonging to more than 700 species. Of these nearly 60 species to the tune of 30 % are economically important for their polysaccharides. Others amounting to 70 % of the biomass are underutilized. These underutilized or unutilized seaweed resources can be used as fodder or feed for cattle either raw or processed. Species of *Enteromorpha, Ulva, Sargassum, Chnoospora, Acanthophora, Hypnea, Gracilaria, Chaetomorpha* and *Caulerpa* can best be tried as fodder.

These seaweed resources grow best in the tidal and inter-tidal waters along our peninsular coastline and the Andaman-Nicobar and the Laccadive archipelagoes. When they are exploited for the purpose of fodder, efforts must be started with immediate effect to augment their production through mariculture means. However, mariculture of seaweeds for the purpose of fodder is not economically attractive. The available resource can be utilized as silages prepared with paddy straw when available in glut conditions and the silage can be stored. This can also improve the effective utilization of paddy straw. Seaweeds are hence no more a mere seaweed but are excellent fodder crops.